

# Cosmological constraints on agegraphic dark energy in DGP braneworld gravity

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**Abstract** A proposal to study the original and new agegraphic dark energy in DGP braneworld cosmology is presented in this work. To verify our model with the observational data, the model is constrained by a variety of independent measurements such as Hubble parameter, cosmic microwave background anisotropies, and baryon acoustic oscillation peaks. The best fitting procedure shows the effectiveness of agegraphic parameter  $n$  in distinguishing between the original and new agegraphic dark energy scenarios and subsequent cosmological findings. In particular, the result shows that in both scenarios, our universe enters an agegraphic dark energy dominated phase.

**Keywords** Agegraphic dark energy · DGP · Brane cosmology

## 1 Introduction

The results from recent cosmological observations in cosmic microwave background (CMB) anisotropies (Spergel et al. 2003; Larson et al. 2011; Komatsu et al. 2009), Hubble parameter (Hub) (Xu and Wang 2011), redshift-distance relationship, of type Ia supernovae (SNIa) (Riess et al. 1998; Kowalski et al. 2008), baryon acoustic oscillation (BAO)

peaks (Frieman et al. 2008), gamma-ray bursts (GRBs) (Vitagliano et al. 2010) and linear growth of large-scale structures (LSS) (Tegmark et al. 2004; Seljak et al. 2005; Eisenstein et al. 2005) strongly verifies the universe expansion. These probes also indicate that the current universe due to some kind of negative pressure form of matter dubbed as dark energy is accelerating (Peebles and Ratra 2003; Padmanabhan 2003; Sahni 2004).

In general, most of the dark energy proposals given in last decay are either not able to explain all features of the universe or introduce too many free parameters have to be fitted with the observational data (Copeland et al. 2006). Alternatively many theoretical attempts intend to shed light on the problem in the framework of more fundamental theories such as string theory or quantum gravity. Although, a complete and comprehensive formulation of quantum gravity has not yet been established, efforts have been made to discover the nature of dark energy according to some principles of the theory. In particular, the so-called holographic dark energy (HDE) models are to be credited as an alternative candidate for dark energy (Horava and Minic 2000; Wei and Cai 2008). They are consistent with quantum principle, in the sense that they obey the Heisenberg type uncertainty relation, and predict a time-varying dark energy equation of state (EoS). The widely studied HDE model is very successful in explaining the observational data. In HDE models by choosing the event horizon of the universe as the length scale, the universe accelerating expansion phase is obtained naturally without resorting to a cosmological constant. However, there is an obvious drawback in holographic approach with regards to causality appears in the theory. Event horizon is a global concept of space time and determines by future evolution of the universe. It only exists for universe with forever accelerated expansion (Guberina et al. 2007; Wei 2009).

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